Looking for Very Short Period Planets with the K2 Mission

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Among the menagerie of bizarre exoplanets, very short-period exoplanets stand out. With orbital periods less than a few days, these unexpected objects pose the severest challenges yet to theories of planetary origins but provide an observational bonanza, making possible studies otherwise unfeasible in the near-term. In this proposal, we briefly describe our plans for using K2 photometry to find more very short-period planets orbiting relatively bright, Sun-like stars and to follow them up with ground-based spectral observations. We request data for 525 targets in K2 Field 6 and 468 targets in Field 7, fewer than 1,000 total, making this a ``small'' proposal. Given the estimated frequency of very short-period planets, we expect to find between 2 and 8 such objects -- a small enough number that a dedicated ground-based follow-up program is imminently feasible but still scientifically compelling. More short-period planets will elucidate planetary origins and motivate exciting observational work. After discovery of Kepler-78 b, there was a world-wide rush to follow it up, and we expect a similar rush for any candidates we find. The origins of all short-period exoplanets remain unclear, but follow-up determination of their masses would let us test the different hypotheses. Moreover, very short-period planets will likely pervade data from the TESS mission, and so a clear theoretical and observational framework for them would motivate and guide additional work with TESS.